

Claims

1. A bioreactor for the treatment of contaminated
5 communal or industrial effluent, or of fluids
contaminated with organic pollutants, in particular
for a small-scale sewage treatment plant, wherein
microorganisms for decomposing organic pollutants are
contained, characterized by a container (22)
10 including at least one recess (26) for the passage of
the effluent to be treated, inside of which a filler
body (30) having a large pore volume as well as a
microbiotic mixture, preferably comprising a
proportion of photosynthetically active
15 microorganisms and a proportion of light-emitting
microorganisms, is provided.
2. The bioreactor in accordance with claim 1, wherein
the filler body (30) has a spiral shape.
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3. The bioreactor in accordance with claim 2, wherein
the diameter of the spiral-shaped filler body (30)
axially increases towards the liquid surface.
- 25 4. The bioreactor in accordance with any one of the
preceding claims, wherein the filler body (30)
comprises a supporting layer on which a foam material
is applied.
- 30 5. The bioreactor in accordance with any one of claims 1
to 3, wherein the filler body (30) has a preferably
grid-shaped, double wall wherebetween a foam material
is arranged.

6. The bioreactor in accordance with any one of claims 1 to 3, wherein the filler body consists of a ceramic material having a large pore volume.
- 5 7. The bioreactor in accordance with claim 4 or 5, wherein the foam material, preferably PU foam, is provided with a catalytically active surface, for example with activated charcoal or the like.
- 10 8. The bioreactor in accordance with claim 7, wherein microorganisms are applied on a surface of the filler body (30), or the microorganisms are centrally introduced inside the strainer basket (22).
- 15 9. The bioreactor in accordance with claim 8, wherein the microorganisms are received in a carrier substance, e.g., chitosane or a biopolymer, for example lactic acid polymer.
- 20 10. The bioreactor in accordance with claim 9, wherein the microbiotic mixture further contains nanoparticles in addition to the microorganisms.
- 25 11. The bioreactor in accordance with any one of the claims appended to claims 7 and 8, wherein the filler body (30) is provided with the microbiotic mixture on the one hand and with a layer favoring formation of a biofilm, e.g., with activated charcoal, on the other hand.
- 30 12. The bioreactor in accordance with any one of claims 2 to 11, wherein the container walls (36) and/or surface areas of the filler body (30) are coated with a photocatalytically active layer.

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13. The bioreactor in accordance with claim 10, wherein the layer is titanium dioxide or indium-tin oxide.
14. The bioreactor in accordance with claim 12 or 13,
5 wherein the photocatalytic layer is applied largely continuously on the inner circumferential surface of the container (22) and in portions on the outer circumferential surface.
- 10 15. The bioreactor in accordance with claim 14, wherein the photocatalytic layer on the outer circumferential surface is applied in the form of stripes, wherein these preferably extend in the longitudinal direction.
- 15 16. The bioreactor in accordance with any one of the preceding claims, wherein recesses (26) of the container (22) are punched out, so that punching burrs (52) project inwardly, and the photocatalytic
20 coating (32) is applied following punching.
17. The bioreactor in accordance with any one of the preceding claims, wherein the container (22) has a cylindrical shape and is provided on the end sides
25 with at least one recess for the passage of liquid.
18. The bioreactor in accordance with any one of the preceding claims, wherein the container (22) or the filler body is mounted rotatably.
- 30 19. Microbiotic mixed culture for the decomposition of organic constituents in fluids, in particular for use in a bioreactor in accordance with any one of the preceding claims, comprising a proportion of
35 photosynthetically active microorganisms and a proportion of light-emitting microorganisms in a

biological solution, characterized in that the mixed culture contains a proportion of piezoelectrically active nano-composite materials, the surface of which is provided with a photocatalytically active layer.

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20. A mixed culture in accordance with claim 19, wherein the nano-composite material has a fiber-type structure with a length of 20 to 100 nm and a diameter of 2 to 10 nm.

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21. The mixed culture in accordance with claim 19 or 20, wherein the coating contains titanium dioxide or indium-tin oxide.

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22. The mixed culture in accordance with any one of claims 19 to 21, wherein the coating of the nano-composite materials is provided with multiple recesses for the formation of pole sites.

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23. The mixed culture in accordance with claim 20 and 22, wherein the coating of the nano-composite particles is interrupted at the end sides, and a respective (60, 62) pole is formed at the two end sides.

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24. Retrofit kit for a small-scale sewage treatment plant, comprising a bioreactor (2) in accordance with any one of claims 1 to 18 and a microbiotic mixed culture in accordance with any one of claims 19 to 23.

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